Introduction to Nanoscience: Workshop for High School Teachers

All events in Duncan Hall 505, SJSU, unless otherwise indicated.

Sponsored by the NSF-funded NanoSense project at SRI International and San Jose State University

Monday June 25, 2007 - AGENDA

8:45 am	Arrival, Check-in and Continental Breakfast Arrive, pick up materials, and make a name badge. Enjoy muffins and juice while you check out the nanoscience demonstrations.
9:00 am	Welcome, Introductions, & Workshop Overview *Tina Stanford, Patti Schank & Maureen Scharberg* Meet us and your fellow workshop participants. We'll discuss goals and expectations for the workshop, and lay out the plan for the day.
10:00 am	Introduction to Nanoscience & its Applications - Presentation *Doris Mourad & Tina Stanford* How small is a nanometer? What are some unusual properties of the nanoscale? How might nanotechnology impact our lives? These and other questions will be addressed through presentation and hands-on activities.
10:45 am	BREAK
11:00 am	Unique Properties at the Nanoscale – Hands-on Lab *Diana Theriault, Doris Mourad & Tina Stanford* We'll do some hands-on labs designed to demonstrate how properties change at the nanoscale.
11:45 am	Lunch (provided) and Debrief We'll have sandwiches, chips and drinks. Yum. (Vegetarian available.)
12:15 pm	Guest Speaker and Demonstration *Kyle Cole, Stanford Center for Probing the Nanoscale* Kyle will demonstrate some of the cool models and activities he has developed to "see" particles and forces at the nanoscale.
12:45 pm	Unique Properties at the Nanoscale – Presentation *Doris Mourad & Tina Stanford* An introduction to what, and how, properties change at the nanoscale.
1:30 pm	BREAK
1:45 pm	Explorer Stations Walk around to different stations (on your own or in your small group, at your own pace) to explore more nanoscience activities. Bring your Reflection Worksheets with you and complete Part 1 of the worksheet as you visit stations.

	Station 1: Tools of the Nanosciences *Kyle Cole* Explore models of tools that help us “see” at the nanoscale. **Station 2: Size and Scale** *Diana Theriault & Doris Mourad* Explore some sorting and number line activities for understanding size and scale. **Station 3: Applications of Nanosciences** *Tina Stanford* Discussion around a PowerPoint slide set that summarizes some exciting applications of nanoscale science. See also the “What's New Nanocat? Poster Session: Student Topic List” for application examples and URLs.
3:00 PM	Form Small Groups Participants form into groups of 3, based on subject area. These small groups will meet each day to discuss what they are learning and how they can use it in the classroom. Discussion will be scaffolded by a Reflection Worksheet. On Thursday, each group will present briefly (15 minutes, plus 5 minutes for discussion) on their ideas for using the activities they have seen, and on an in-depth lesson plan. In small groups, complete Part 2 of the Reflection Worksheet for the day. You’ll have 15 minutes tomorrow morning to finalize them, too.
3:20 pm	Whole Group Discussion We’ll reflect on the day as a group.
3:30 pm	Adjourn We’d like to make copies of your reflection worksheets! If you can give them to us before we go, we’ll give them back tomorrow morning.
Evening	Homework Spend at least an hour reading, surfing the web, and thinking about your WOW project (see the WOW project worksheet; will be handed out). Each individual will pick some unique, exciting application of nanotechnology, and create a short handout and presentation (5 minutes) about it to share with the group on Thursday afternoon.

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Tuesday June 26, 2007 - AGENDA

8:45 am	Arrival, Continental Breakfast Enjoy muffins and juice and chat with your colleagues.
9:00 am	WOW Project Check-In and Questions *Tina Stanford* We'll discuss any questions or concerns you might have regarding goals, expectations, materials, etc.
9:15 am	Small Groups Meet Meet to finalize yesterday's Reflection Worksheet.
9:30 am	Introduction to Clear Sunscreen - Presentation *Alyssa Wise* How do "nano-sunscreens" differ from traditional sunscreens? What is the best kind of sunscreen to use and why? Alyssa will introduce the clear sunscreen unit and issues related to such questions.
10:00 am	Ultra-Violet Beads – Hands-on Activity *Maureen Scharberg & Alyssa Wise* We'll investigate whether the appearance of a substance (its opacity) relates to its ability to block UV light.
10:45 am	BREAK
11:00 am	All About Sunscreens – Presentation *Alyssa Wise* A presentation and discussion of the core ideas behind how sunscreens block UV light and why they appear the way that they do.
12:00 pm	Lunch (provided) and Debrief We'll have pizza and drinks. Yum. (Vegetarian options available.)
12:30 pm	Guest Speaker and Demonstration *Bob London, Taxonomize* Bob will demonstrate a new nanoscience wiki with some nice resources. See http://nano-wiki.com
1:00 pm	Explorer Stations Walk around to different stations to explore different hands-on activities. Bring your Reflection Worksheets with you and take notes!

	Station 1: Sunscreen Labels *Maureen Scharberg* What kinds of chemicals are used to block the suns rays? Do different sunscreens use different ingredients to block the sun? How might the different ingredients affect us? **Station 2: Scattering of Light by Particles: Sunscreen Animations** *Tina Stanford and Patti Schank* View and discuss animated models of how visible light interacts with "large" and nano-sized zinc oxide particles. Play with a tool that you can use to create an animation to show how nano sunscreen particles don't scatter visible light and thus are transparent. **Station 3: Consumer Choice Pamphlet** *Alyssa Wise & Diana Theriault* Create a pamphlet to inform consumers about nanoparticulate sunscreens, how they work, and their benefits and drawbacks.
2:30 pm	BREAK
2:45 pm	Small Groups Meet In small groups, complete Part 2 of the Reflection Worksheet for the day.
3:15 pm	Whole Group Discussion We'll reflect on the day as a group.
3:30 pm	Adjourn We'd like to make copies of your reflection worksheets! If you can give them to us before we go, we'll give them back tomorrow morning.
Evening	Homework Spend at least an hour working on your WOW project handout and presentation for Thursday.

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Wednesday June 27, 2007 - AGENDA

8:45 am	Arrival, Continental Breakfast Enjoy muffins and juice and chat with your colleagues.
9:00 am	WOW Project Check-In and Questions *Tina Stanford* We'll discuss any questions or concerns you might have regarding goals, expectations, materials, etc.
9:15 am	Introduction to Clean Energy - Presentation *Maria Powell* An introduction to the issue of energy production as a pressing global issue and how nanoscience could enable important breakthroughs in energy generation and conversion.
10:00 am	BREAK
10:15 am	Explorer Stations Walk around to different stations to explore different hands-on activities. Bring your Reflection Worksheets with you and take notes! **Station 1: How Solar Cells Work: Solar Cell Animations** *Maureen Scharberg* View and discuss animated models of how traditional and nanocrystalline solar cells work. **Station 2: Nanocrystalline Solar Cell Lab** *Maria Powell* Build a nanocrystalline solar cell and use it to generate electricity.
11:30 am	Fine Filters Introduction – Presentation *Maria Powell & Tina Stanford* An introduction to the global water crisis: where and why clean drinking water is scarce, and the impact of water scarcity.
12:00 pm	Lunch (provided) and Debrief We'll have Chinese chicken salad and drinks. Yum. (Vegetarian available.)
12:30 pm	Fine Filters Membrane Technology – Presentation *Tina Stanford* An overview of common filtration technologies and how nanofiltration differs.

1:00 pm	Explorer Stations Walk around to different stations to explore different hands-on activities. Bring your Reflection Worksheets with you and take notes! **Station 1: Science of Water Labs** *Diana Theriault* Explore aspects of the unique chemistry of water, including surface tension, of cohesion and adhesion of water, boiling temperature and the heat capacity of water, and density of water versus ice. **Station 2: Filtration Labs** *Tina Stanford* Begin with a mixture of substances and run them through a series of filtration systems, ending with nanofiltration. **Station 3: Jarny Activity** *Alyssa Wise* Plan a method to provide drinking water to the people of Jarny, who are having a serious problem with their drinking water.
2:15 pm	BREAK
2:30 pm	Small Groups Meet In small groups, complete the final Reflection Worksheet and prepare presentation (3 PowerPoint slides or 3 flip chart pages) for tomorrow.
3:15 pm	Whole Group Discussion We'll reflect on the day as a group.
3:30 pm	Adjourn We'd like to make copies of your reflection worksheets! If you can give them to us before we go, we'll give them back tomorrow morning.
Evening	Homework Complete your WOW project handout and presentation notes.

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Thursday June 28, 2007 - AGENDA

8:45 am	Arrival, Continental Breakfast Enjoy muffins and juice and chat with your colleagues.
9:00 am	Small Group Presentations Each small group presents to the larger group on their on their ideas for using the activities they saw over the week, and one lesson plan they developed. Plan on 20 minutes per group, including discussion. Presentations will be collected and disseminated to all participants electronically.
10:30 am	BREAK
10:45 am	Small Group Presentations - Continued
12:00 pm	Lunch (provided) and Debrief We'll have sandwiches, chips and drinks. Yum. (Vegetarian available.)
12:45 pm	Individual WOW presentations Each individual participant presents to the larger group on their on their WOW application. Plan on 5 minutes per presentation, including discussion. Presentations will be collected and disseminated to all participants electronically.
2:15 pm	BREAK
2:30 pm	Cookies and Workshop Survey Enjoy cookies and drinks while completing a short survey about the workshop.
2:45 pm	Reflection *Ellen Mandinach* Reflect on the workshop and discuss ideas that were particularly interesting or perhaps unclear.
3:15 pm	Get Certificates, Stipend Forms, and Ajourn Get your certificates of participation, and a form to complete to receive your workshop stipend. Before you go, please give us electronic copies of your presentations so that we can share them with the group!